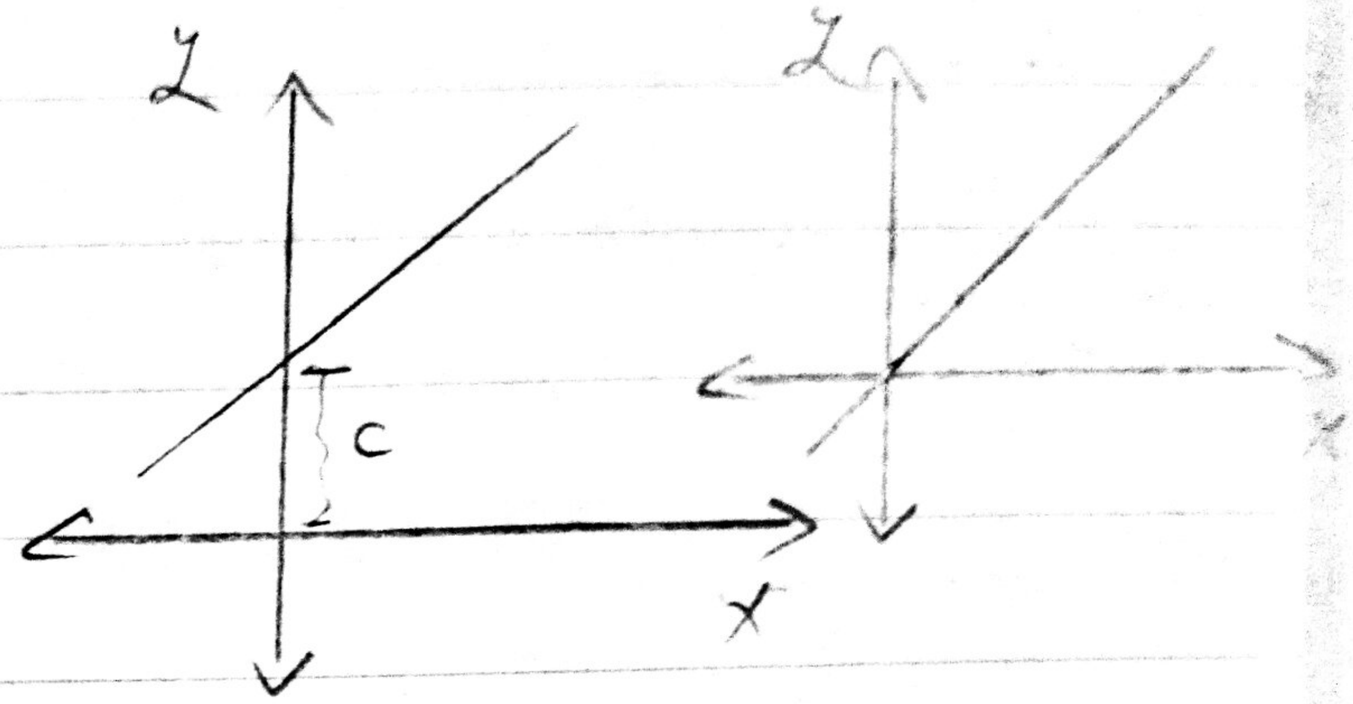
Subject. (S.o1) Date.

Two Fold eqn. of two Lines

$y = mx$

$y = mx + c$



zero form:-

$y - mx = 0$, $y - mx - c = 0$

* Slope of straight line :-

m ; ① $\frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x} = m$

② $\tan\theta = m$

③ $\frac{dy}{dx} = m$

Forwing Straight Line equation

① $\frac{y - y_1}{x - x_1} = \frac{y_2 - y_1}{x_2 - x_1}$

② $\frac{y - y_1}{x - x_1} = m$

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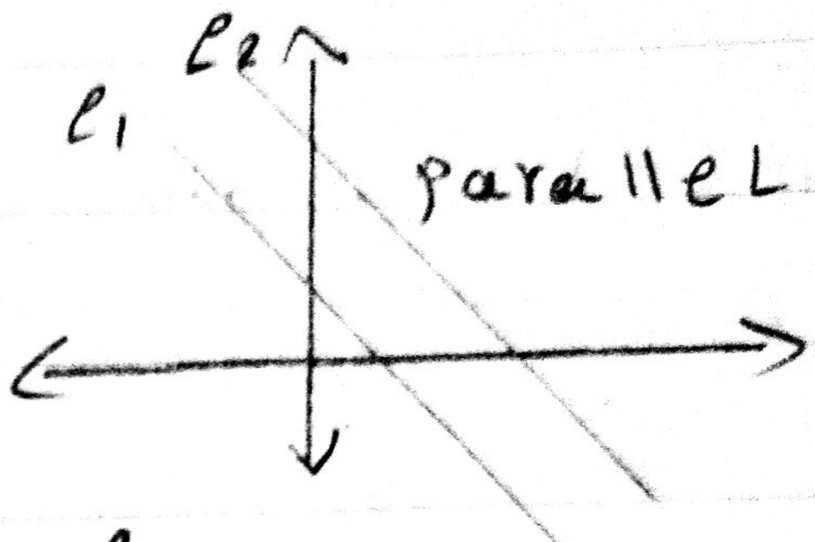
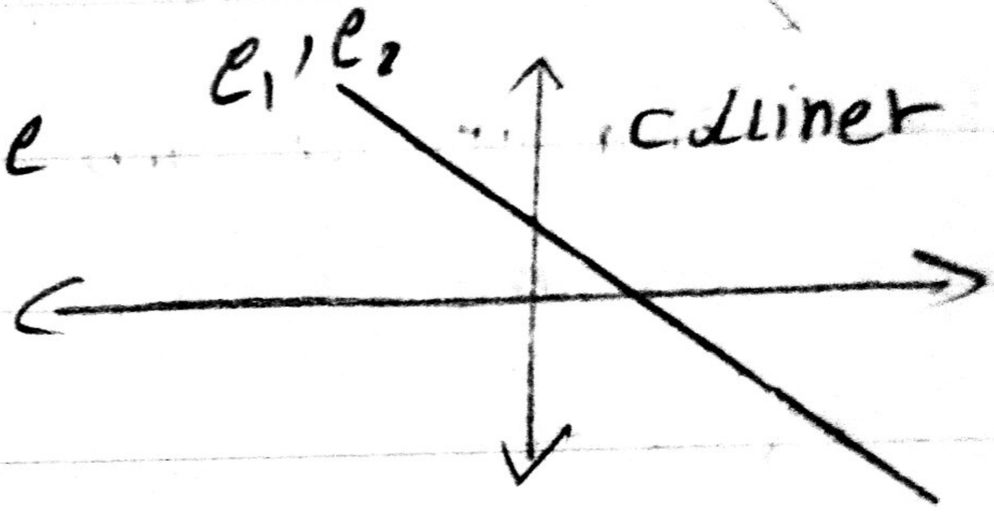
$e_1 : a_1X + b_1y + c_1 = 0$

$e_2 : a_2X + b_2y + c_2 = 0$

$\frac{a_1}{a_2} = \frac{b_1}{b_2} \Longrightarrow e_1 // e_2$



$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \Longrightarrow$ The Same



★ Angle between two intersected lines :-

$$\tan\theta = \frac{m_2 - m_1}{1 + m_1 m_2}$$

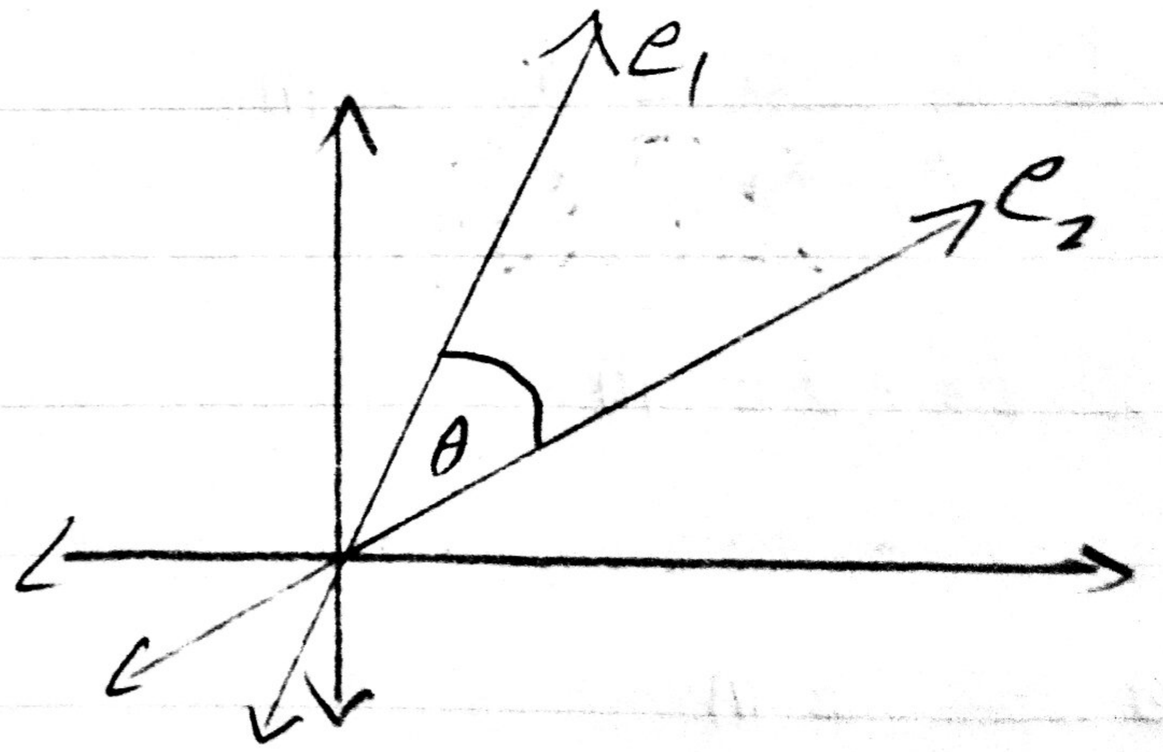
$\tan 90 = \frac{1}{0}$

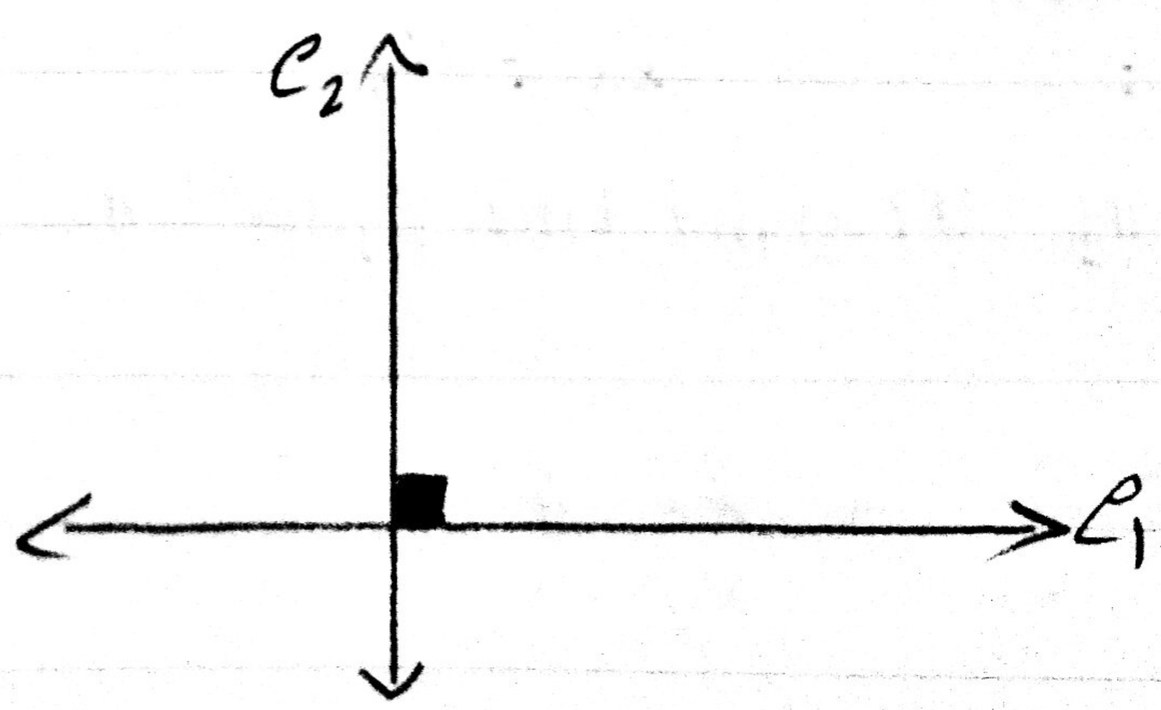
$1 + m_1 m_2 = 0$

$m_1 m_2 = -1$

$y = 2x$

$y = -\frac{1}{2}x$





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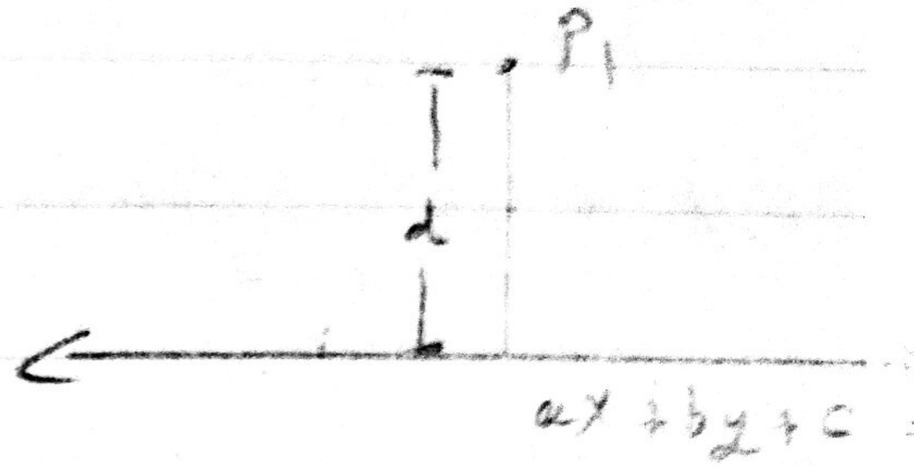
Distance between $P_1(x_1, y_1)$ and a line :-

$$d = \frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}}$$



Two fold eqn of Two lines passing Through The orrgin (

$ax^2 + by^2 + 2hxy = 0$ (Homogenous of 2nd dgree

$$a + b\left(\frac{y}{x}\right)^2 + 2h\frac{y}{x} = 0$$

$$\frac{y}{x} = \frac{-2h \pm \sqrt{(2h)^2 - 4ab}}{2b}$$

$$\frac{y}{x} = \frac{-h \pm \sqrt{h^2 - ab}}{b} = m$$

$h^2 - ab$
- $= 0$ → Collinet
- < 0 → تخيلات حقيقية
- > 0 → قيمان

$\frac{y}{x} = m_1$ $\frac{y}{x} = m_2$

Subject..... Date.....

Angle between two straight lines :-

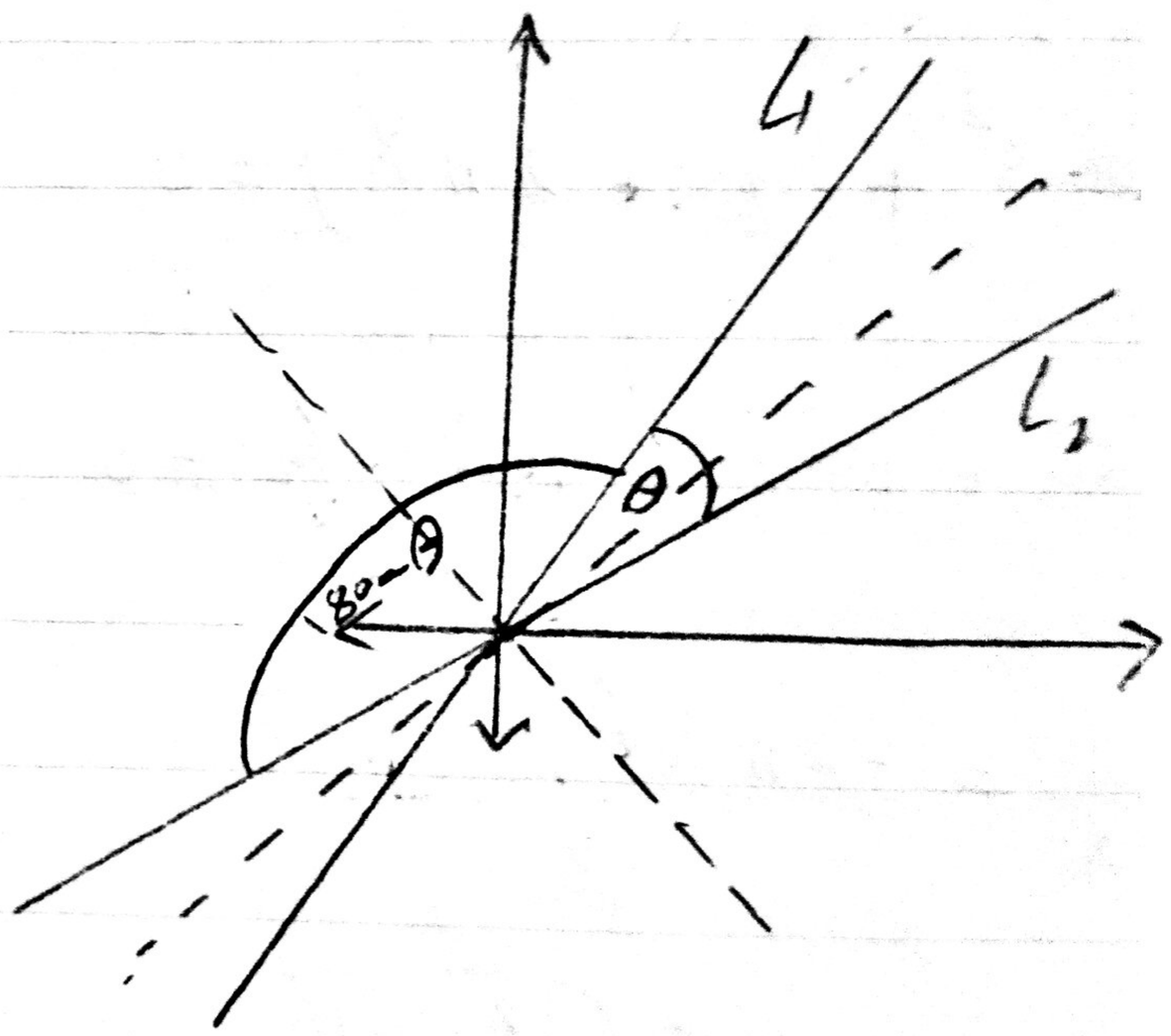
$$\tan\theta = \frac{2\sqrt{h^2 - ab}}{a+b}$$

two fold eqn. of two Bisectors to angle between two straight lines passing through the origin :-

$$\frac{x^2 - y^2}{a-b} = \frac{xy}{h}$$

$B_1 \perp B_2$

perpendicular



EX:-

prove that the following eqn represent two lines eqns.
and find these lines, The Angle between them,
and the two fold eqn of the bisectors:-

$3x^2 - xy - 10y^2 = 0$

Sol

$ax^2 + by^2 + 2hxy = 0$

$a = 3, b = -10, h = -\frac{1}{2}$

$h^2 - ab = \frac{1}{4} - (3 \times -10) = 30.25$ #

$\frac{y}{x} = \frac{-h \pm \sqrt{h^2 - ab}}{b}$

$\frac{y}{x} = \frac{-3}{5}$ $\qquad$ $\frac{y}{x} = \frac{1}{2}$ #

$\tan\theta = \frac{2\sqrt{h^2 - ab}}{a + b} = r$

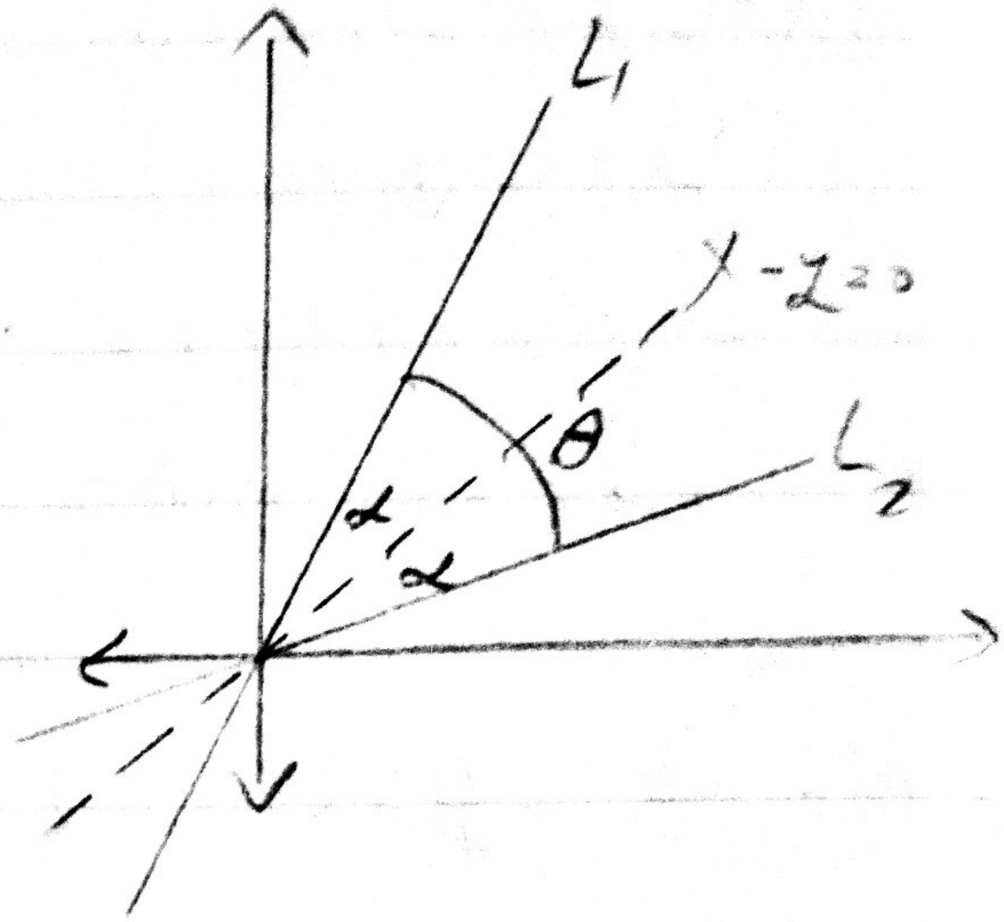
$\theta = \tan^{-1} r = -57.7$ #

$\frac{x^2 - y^2}{3 + 10} = \frac{xy}{-\frac{1}{2}}$

$x^2 + 26xy - y^2 = 0$ #

Ex :-

prove that the two Fold equation of the two lines passing through $(0,0)$ and mark Angle α with $X-Y=0$ is $X^2+2\sec(2\alpha)XY+Y^2=0$



$X-Y=0 \longrightarrow B_1$

$X+Y=0 \longrightarrow B_2$

$(X^2-Y^2)=0$

$$\frac{X^2-Y^2}{a-b}=\frac{XY}{h}$$

$$\frac{1}{\frac{1}{a-b}}=\frac{0}{\frac{1}{h}}$$

$a-b=0 \implies a=b$

$$\tan\theta=\frac{2\sqrt{h^2-ab}}{a+b}$$

$$\tan\theta=\frac{2\sqrt{h^2-a^2}}{2a}$$

$$a\tan\theta=\sqrt{h^2-a^2}$$

$$a^2\tan^2\theta=h^2-a^2$$

$$h^2=a^2(1+\tan^2\theta)$$

$$h^2=a^2\sec^2 2\alpha$$

$$h=\pm a\sec 2\alpha$$

$$aX^2+bY^2+2hXY=0$$

$$aX^2+aY^2+2a\sec 2\alpha XY=0$$

$$X^2+2\sec 2\alpha XY+Y^2=0$$